

From LLNL Table 4.8, p. 52

Table 4.13-2 LLNL-Estimated Life-Cycle Costs for DOE Depleted UF<sub>6</sub> to Depleted U<sub>3</sub>O<sub>8</sub> Conversion  
Page 1 of 1

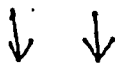
LLNL-ESTIMATED LIFE-CYCLE COSTS FOR DOE DEPLETED UF <sub>6</sub> TO DEPLETED U <sub>3</sub> O <sub>8</sub> CONVERSION (A) (MILLION DOLLARS FOR 378,600 MTU OF DEPLETED UF <sub>6</sub> OVER 20 YEARS; DISCOUNTED 1996 DOLLARS)		
Conversion Capital & Operating Activities	AHF Conversion Alternative	HF Neutralization Conversion Alternative
Technology Department	A 9.84	I 5.74
Process Equipment	B 22.36	J 20.88
Process Facilities	C 46.33	K 45.53
Balance of Plant	D 29.20	L 30.25
Regulatory Compliance	E 22.70	M 22.70
Operations & Maintenance	F 134.76	N 198.40
Decontamination & Decommissioning	G 1.76	O 1.73
<b>Total Discounted Costs (1996 Dollars):</b>	<b>H 266.95</b>	<b>P 325.23</b>
<b>Total Undiscounted Costs (1996 Dollars):</b>	<b>AK 902.6</b>	<b>AL 1,160.1</b>
<b>Undiscounted Unit Costs (\$/kgU):</b>		
TOTAL (1996 Dollars)	U 2.38	AE 3.05
TOTAL (2002 Dollars per GDP IPD)	Z 2.64	AJ 3.39
(a) Source: (LLNL, 1997a)		
AHF: Assumes sale of anhydrous hydrogen fluoride; \$77.32 million credit assumed. HF: Assumes sale of calcium fluoride (CaF <sub>2</sub> ) produced from hydrogen fluoride (HF); \$11.02 million credit assumed.		

From LES-A

Cost Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride  
May 1997

Table 4.8 Cost Breakdown (in Millions of Dollars) for Conversion Options

	U <sub>3</sub> O <sub>8</sub>		UO <sub>2</sub>			Metal	
	With AHF Production	With HF Neutralization	With AHF Production	With HF Neutralization	Gelation	Batch Metallothermic Reduction	Continuous Metallothermic Reduction
Tech. Development	1 A 9.84	I 5.74	13.94	9.84	24.60	4.92	20.50
Process Equipment							
Engineering	4.74	4.43	7.74	7.13	21.98	7.80	6.52
Fabrication	11.91	10.93	18.96	17.41	51.81	17.98	15.22
Installation	5.19	5.04	8.91	8.27	27.18	10.03	8.20
Certification & Test	0.52	0.48	0.83	0.76	2.26	0.79	0.66
Subtotal	B 22.36	J 20.88	36.44	33.57	103.23	36.60	30.60
Process Facilities							
Engineering	10.16	9.98	14.91	13.58	23.89	18.27	16.09
Construction	29.56	29.05	43.39	39.50	69.51	53.14	46.82
Proj. Management	6.61	6.50	9.71	8.84	15.55	11.89	10.47
Subtotal	C 46.33	K 45.53	68.01	61.92	108.95	83.30	73.38
Balance of Plant							
Engineering	6.40	6.63	7.76	7.66	13.08	8.33	8.22
Construction	18.63	19.30	22.57	22.29	38.04	24.22	23.91
Proj. Management	4.17	4.32	4.12	4.99	8.51	5.42	5.35
Subtotal	D 29.20	L 30.25	34.45	34.94	59.63	37.97	37.48
Regulatory Compliance	E 22.70	M 22.70	22.70	22.70	22.70	22.70	22.70
Operations and Maintenance							
Material	52.71	55.96	66.12	66.45	261.94	189.74	171.76
Utilities	12.83	13.10	14.55	14.82	46.05	23.84	13.30
Labor	134.68	137.44	152.72	155.48	242.11	250.19	139.57
Waste Management & Disposal	11.86	2.92	12.47	3.47	24.45	39.14	6.14
By-product Revenue	-77.32	-11.02	-77.31	-11.02	-77.32	-26.11	-26.11
Subtotal	F 134.76	N 198.40	168.55	229.20	497.23	476.80	304.66
Decont. & Decom.	G 1.76	O 1.73	2.51	2.34	4.87	2.83	2.54
<b>TOTAL</b>	H 266.95	P 325.23	346.60	394.51	821.21	665.12	491.86



To ER Table 4.13-2



Table 4.13-3 Summary of LLNL-Estimated Capital, Operating and Regulatory Unit Costs for DOE Depleted UF<sub>6</sub> to Depleted U<sub>3</sub>O<sub>8</sub> Conversion

Page 1 of 1

SUMMARY OF LLNL-ESTIMATED CAPITAL, OPERATING, AND REGULATORY UNIT COSTS FOR DOE DEPLETED UF <sub>6</sub> TO DEPLETED U <sub>3</sub> O <sub>8</sub> CONVERSION (A) (UNDISCOUNTED DOLLARS PER KILOGRAMS OF U AS DEPLETED UF <sub>6</sub> )				
Cost Breakdown	AHF Alternative		HF Neutralization Alternative	
	1996\$	2002\$	1996\$	2002\$
Capital (b)	R+T 0.72	W+Y 0.80	AB+AD 0.69	AG+AD 0.76
Operating & Maintenance	Q 1.51	V 1.67	AA 2.22	AF 2.46
Regulatory Compliance	S 0.14	X 0.16	AC 0.14	AH 0.16
Total:	U 2.38	Z 2.64	AE 3.05	AJ 3.39
(a) Unit costs based on Table 4.13-2 costs.				
(b) Technology development, process equipment, process facilities, balance of plant and decontamination and decommissioning.				
Source: (LLNL, 1997a)				
Note: Summation may be affected by rounding.				

From LES-A

From LLNL Table 4.12, p.64-65

Table 4.13-4 LLNL-Estimated Life-Cycle Costs for DOE Depleted UF<sub>6</sub> Disposal Alternatives  
Page 1 of 1

LLNL-ESTIMATED LIFE-CYCLE COSTS FOR DOE DEPLETED U <sub>3</sub> O <sub>8</sub> DISPOSAL ALTERNATIVES (MILLION DOLLARS FOR 378,600 MTU OF DEPLETED UF <sub>6</sub> OVER 20 YEARS; UNDISCOUNTED 1996 DOLLARS)				
Depleted U <sub>3</sub> O <sub>8</sub> Disposal Capital & Operating Activities	Depleted U <sub>3</sub> O <sub>8</sub> Disposal Alternatives			
	Engineered Trench		Concrete Vault	
<b>Waste Form Preparation:</b>				
Technology Development	A	6.56	G	6.56
Balance of Plant	B	26.43	H	26.43
Regulatory Compliance	C	2.02	I	2.02
Operations & Maintenance	D	33.23	J	33.23
Decontamination & Decommissioning	E	0.60	K	0.60
Subtotal (1996 Discounted Dollars)	F	68.84	L	68.84
<b>Waste Disposal:</b>				
Facility Engineering & Construction	M	12.22	S	96.08
Site Preparation & Restoration	N	0.89	T	1.68
Emplacement & Closure	O	30.61	U	39.2
Regulatory Compliance	P	40.35	V	40.35
Surveillance & Maintenance	Q	2.29	W	2.86
Subtotal (1996 Discounted Dollars)	R	86.36	X	180.17
Preparation & Disposal Discounted Total Costs (1996 Dollars):	Y	155.20	Z	249.01
Preparation & Disposal Undiscounted Total Costs (1996 Dollars):	AA	499.60	AD	742.50
<b>Undiscounted Unit Costs (\$/kgU):</b>				
TOTAL (1996 Dollars)	AB	1.31	AE	1.95
TOTAL (2002 Dollars per GDP IPD)	AC	1.46	AF	2.17
Source: (LLNL, 1997a)				

From LES-B

Cost Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride  
May 1997

Table 4.12 Cost Breakdown (in Millions of Dollars) for Disposal Options

	U <sub>3</sub> O <sub>8</sub> Bulk			U <sub>3</sub> O <sub>8</sub> Grouted			UO <sub>2</sub> Bulk			UO <sub>2</sub> Grouted		
	Engineered Trench	Vault	Mined Cavity	Engineered Trench	Vault	Mined Cavity	Engineered Trench	Vault	Mined Cavity	Engineered Trench	Vault	Mined Cavity
<b>Preparation</b>												
Technology Development	A 6.56	G 6.56	8.20	8.20	8.20	9.84	6.56	6.56	8.20	8.20	8.20	9.84
Process Equipment												
Engineering	0.00	0.00	0.00	5.61	5.61	5.61	0.00	0.00	0.00	4.32	4.32	4.32
Fabrication	0.00	0.00	0.00	16.78	16.78	16.78	0.00	0.00	0.00	12.98	12.98	12.98
Installation	0.00	0.00	0.00	4.65	4.65	4.65	0.00	0.00	0.00	3.53	3.53	3.53
Certification and Test	0.00	0.00	0.00	0.60	0.60	0.60	0.00	0.00	0.00	0.46	0.46	0.46
Subtotal	0.00	0.00	0.00	27.64	27.64	27.64	0.00	0.00	0.00	21.29	21.29	21.29
Process Facilities												
Engineering	0.00	0.00	0.00	6.27	6.27	6.27	0.00	0.00	0.00	3.71	3.71	3.71
Construction	0.00	0.00	0.00	17.39	17.39	17.39	0.00	0.00	0.00	10.28	10.28	10.28
Project Management	0.00	0.00	0.00	4.01	4.01	4.01	0.00	0.00	0.00	2.37	2.37	2.37
Subtotal	0.00	0.00	0.00	27.67	27.67	27.67	0.00	0.00	0.00	16.36	16.36	16.36
Balance of Plant												
Engineering	6.01	6.01	6.01	10.90	10.90	10.90	3.63	3.63	3.63	7.68	7.68	7.68
Construction	16.56	16.56	16.56	30.05	30.05	30.05	9.99	9.99	9.99	21.17	21.17	21.17
Project Management	3.86	3.86	3.86	7.00	7.00	7.00	2.33	2.33	2.33	4.93	4.93	4.93
Subtotal	B 26.43	H 26.43	26.43	47.95	47.95	47.95	15.95	15.95	15.95	33.78	33.78	33.78
Regulatory Compliance												
Operation & Maintenance	C 2.02	I 2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02
Materials	0.14	0.14	0.14	122.86	122.86	122.86	0.08	0.08	0.08	13.26	13.26	13.26
Utilities & Consumables	3.51	3.51	3.51	6.04	6.04	6.04	1.95	1.95	1.95	3.32	3.32	3.32
Labor	28.41	28.41	28.41	75.60	75.60	75.60	28.36	28.36	28.36	70.87	70.87	70.87
Waste Management	1.17	1.17	1.17	1.98	1.98	1.98	0.72	0.72	0.72	1.19	1.19	1.19
Subtotal	D 33.23	J 33.23	33.23	206.48	206.48	206.48	31.11	31.11	31.11	88.64	88.64	88.64
Decont. & Decom.	E 0.60	K 0.60	0.60	1.83	1.83	1.83	0.38	0.38	0.38	1.26	1.26	1.26
<b>Total Preparation Cost</b>	F 68.84	L 68.84	70.48	321.79	321.79	323.43	56.02	56.02	57.66	171.55	171.55	173.19

[Table 4.12 is continued on the next page].

↓ ↓  
To ER Table 4.13-4



Cost Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride  
May 1997

Table 4.12 Cost Breakdown (in Millions of Dollars) for Disposal Options (Continued)

	U <sub>3</sub> O <sub>8</sub> Bulk			U <sub>3</sub> O <sub>8</sub> Grouted			UO <sub>2</sub> Bulk			UO <sub>2</sub> Grouted		
	Engineered Trench	Vault	Mined Cavity	Engineered Trench	Vault	Mined Cavity	Engineered Trench	Vault	Mined Cavity	Engineered Trench	Vault	Mined Cavity
<b>Facility</b>												
Engineering	3.73	29.33	87.05	7.12	61.85	119.05	1.86	8.42	72.16	2.50	12.81	79.56
Construction	7.20	56.62	271.44	13.73	119.41	371.21	3.59	16.25	225.01	4.82	24.73	248.07
Project Management	1.29	10.13	50.53	2.46	21.37	69.11	0.64	2.91	41.89	0.86	4.43	46.18
Subtotal	M 12.22	S 96.08	409.02	23.31	202.63	559.37	6.09	27.58	339.06	8.18	41.97	373.81
<b>Site Prep &amp; Restoration</b>												
Engineering	0.17	0.32	3.62	0.27	0.55	3.78	0.11	0.14	3.55	0.13	0.17	3.59
Construction	0.61	1.15	13.18	0.97	1.99	13.75	0.40	0.49	12.91	0.47	0.63	13.05
Project Management	0.11	0.21	2.41	0.18	0.36	2.51	0.07	0.09	2.36	0.09	0.12	2.38
Subtotal	N 0.89	T 1.68	19.21	1.42	2.90	20.04	0.58	0.72	18.82	0.69	0.92	19.02
<b>Emplacement &amp; Closure</b>												
Materials	1.40	2.15	28.49	2.45	3.17	47.31	0.85	0.79	24.76	1.05	1.50	35.06
Equipment	3.63	3.84	183.46	5.16	5.24	357.60	2.33	2.23	103.23	2.44	2.76	143.39
Labor	25.58	33.21	36.93	35.82	66.26	44.80	14.43	23.71	33.30	18.55	30.06	43.28
Subtotal	O 30.61	U 39.20	248.88	43.43	74.67	449.71	17.61	26.73	161.29	22.04	34.32	221.73
<b>Regulatory Compliance Surveillance &amp; Maintenance</b>												
Materials	0.79	1.36	0.58	1.03	2.76	0.75	0.67	0.44	0.42	0.71	0.63	0.58
Labor	1.50	1.50	1.63	1.50	1.50	1.63	1.50	1.50	1.63	1.50	1.50	1.63
Subtotal	Q 2.29	W 2.86	2.21	2.53	4.26	2.38	2.17	1.94	2.05	2.21	2.13	2.21
<b>Total Facility Cost</b>	R 86.36	X 180.17	719.67	111.04	324.81	1,071.85	66.80	97.32	561.57	73.47	119.69	657.12

228

	U <sub>3</sub> O <sub>8</sub> Bulk			U <sub>3</sub> O <sub>8</sub> Grouted			UO <sub>2</sub> Bulk			UO <sub>2</sub> Grouted		
	Engineered Trench	Vault	Mined Cavity	Engineered Trench	Vault	Mined Cavity	Engineered Trench	Vault	Mined Cavity	Engineered Trench	Vault	Mined Cavity
<b>GRAND TOTAL</b>	Y 155.20	Z 249.01	790.15	432.83	646.60	1,395.28	122.82	153.34	619.23	245.02	291.24	830.31

↓ ↓  
To ER Table 4.13-4

Year		Disc Multiplier	
	1996	7.0%	recip
1	2009	2.410	0.415
2	2010	2.579	0.388
3	2011	2.759	0.362
4	2012	2.952	0.339
5	2013	3.159	0.317
6	2014	3.380	0.296
7	2015	3.617	0.277
8	2016	3.870	0.258
9	2017	4.141	0.242
10	2018	4.430	0.226
11	2019	4.741	0.211
12	2020	5.072	0.197
13	2021	5.427	0.184
14	2022	5.807	0.172
15	2023	6.214	0.161
16	2024	6.649	0.150
17	2025	7.114	0.141
18	2026	7.612	0.131
19	2027	8.145	0.123
20	2028	8.715	0.115
			4.704

D+O+Q E C+P A+B +M+N Y				
Engineered Trench Disposal				
O&M	D&D	Regul.	Capital	Total
66.13	0.60	42.37	46.10	155.20
Undiscounted Costs in 1996\$				

J+U+W E I+V G+H +S+T Z.				
Concrete Vault Disposal				
O&M	D&D	Regul.	Capital	Total
75.29	0.6	42.37	130.75	249.0
Undiscounted Costs in 1996\$				

← From LLNL Table 4.12, p 64-65

METHODOLOGY  
SAME AS  
SHOWN ON  
LES-A

Million 1996\$ w/o disc.  
\$ per kgU

281.2	5.2	102.1	111.1	499.6	AA	320.1	5.2	102.1	315.1	742.5	AD
0.74	0.01	0.27	0.29	1.31	AB	0.84	0.01	0.27	0.83	1.95	AE

Million 2002\$ w/ esc at GDP-IPD from 1996  
\$ per kgU

312.1	5.8	113.3	123.3	554.6	AC	355.3	5.8	113.3	349.7	824.2	
0.82	0.02	0.30	0.32	1.46		0.94	0.02	0.30	0.92	2.17	AF

19 1.11

Assumptions

1. First year of operation is 2009
2. 19,000 MTU per year processed (LLNL page 20)
3. 20 year operating period (LLNL page 20)
4. All capital and regulatory costs take place in first year
5. O&M costs evenly divided over 20 operating years
6. All D&D costs take place in final year
7. Original costs provided in 1996\$ (LLNL page 20)
8. Discount rate is 7% per year (LLNL page 25)
9. Summation may be affected by rounding

To ER Table 4.13-4

LES-B



Table 4.13-5 Summary of Total Estimated Conversion and Disposal Costs  
Page 1 of 1

From LES-A →  
From LES-B →  
From LES-C →

SUMMARY OF TOTAL ESTIMATED CONVERSION AND DISPOSAL COSTS (UNDISCOUNTED 2002 DOLLARS PER KGU OF DEPLETED UF <sub>6</sub> )				
Cost Items	AHF Alternative		HF Neutralization Alternative	
	Engineered Trench	Concrete Vault	Engineered Trench	Concrete Vault
Depleted UF <sub>6</sub> Conversion to Depleted U <sub>3</sub> O <sub>8</sub>	Z 2.64	Z 2.64	AJ 3.39	AJ 3.39
Waste Preparation & Disposal	AC 1.46	AF 2.17	AC 1.46	AF 2.17
Depleted UF <sub>6</sub> & Depleted U <sub>3</sub> O <sub>8</sub> Transportation	AX 0.25	AX 0.25	AX 0.25	AX 0.25
<b>Total Cost:</b>	<b>4.35</b>	<b>5.06</b>	<b>5.1</b>	<b>5.81</b>

From LLNL Table 4.5 A+B, p.43 [=11.28+8.70]

Year	Disc Multiplier		
	1996	7.0% recip	
1	2009	2.410	0.415
2	2010	2.579	0.388
3	2011	2.759	0.362
4	2012	2.952	0.339
5	2013	3.159	0.317
6	2014	3.380	0.296
7	2015	3.617	0.277
8	2016	3.870	0.258
9	2017	4.141	0.242
10	2018	4.430	0.226
11	2019	4.741	0.211
12	2020	5.072	0.197
13	2021	5.427	0.184
14	2022	5.807	0.172
15	2023	6.214	0.161
16	2024	6.649	0.150
17	2025	7.114	0.141
18	2026	7.612	0.131
19	2027	8.145	0.123
20	2028	8.715	0.115
			4.704

Rail Transportation				
O&M	D&D	Regul.	Capital	Total
19.98	0	0	0	20.0
Undiscounted Costs in 1996\$				
4.25		0.0	0.0	

METHODOLOGY  
 SAME AS  
 SHOWN ON  
 LES-A

Million 1996\$ w/o disc. 85.0 0.0 0.0 0.0 85.0  
 \$ per kgU 0.22 0.00 0.00 0.00 0.22

Million 2002\$ w/ esc at GDP-IPD from 1996 94.3 0.0 0.0 0.0 94.3  
 \$ per kgU 0.25 0.00 0.00 0.00 0.25 AX

19 1.11

Assumptions

1. First year of operation is 2009
2. 19,000 MTU per year processed (LLNL page 20)
3. 20 year operating period (LLNL page 20)
4. All capital and regulatory costs take place in first year
5. O&M costs evenly divided over 20 operating years
6. All D&D costs take place in final year
7. Original costs provided in 1996\$ (LLNL page 20)
8. Discount rate is 7% per year (LLNL page 25)
9. Summation may be affected by rounding

→ To ERTable 4.13-5

LES-C

Cost Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride  
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Table 4.5 Loading, Shipping, and Unloading Cost Breakdown (in Millions of Dollars) by Truck and Rail

	No Action		DUF <sub>6</sub> Long Term Storage		U <sub>3</sub> O <sub>8</sub> w/AHF Production/Neutralization Storage/Disposal		UO <sub>2</sub> Gelation Storage/Disposal		UO <sub>2</sub> w/AHF Production/Neutralization Storage/Disposal		UO <sub>2</sub> Gelation Use		Batch Metal Reduction Use		Continuous Metal Reduction Use	
	truck	rail	truck	rail	truck	rail	truck	rail	truck	rail	truck	rail	truck	rail	truck	rail
From Current Site to Conversion Facility	0.00	0.00	-	-	23.25	A 11.28	23.25	11.28	23.25	11.28	23.25	11.28	23.25	11.28	23.25	11.28
From Conversion Site to Storage/Disposal Site	0.00	0.00	-	-	12.76	B 8.70	13.14	8.55	-	-	-	-	-	-	-	-
From Conversion Site to DUCRETE™ Container Manufacturer	-	-	-	-	-	-	-	-	13.41	8.24	13.14	8.55	-	-	-	-
From DUCRETE™ Container Manufacturer to SNF Container User	-	-	-	-	-	-	-	-	rail 9.33	9.33	9.33	9.33	-	-	-	-
From Conversion Site to Metal Annulus Manufacturer	-	-	-	-	-	-	-	-	-	-	-	-	10.43	7.15	10.76	7.30
From Metal Annulus Manufacturer to SNF Container User	-	-	-	-	-	-	-	-	-	-	-	-	rail 8.86	8.86	8.86	8.86
From Conversion Facility to Cylinder Treatment Facility	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	-	0.00
From Cylinder Treatment Facility to DOE Yards (crushed cylinders)	0.00	0.00	-	-	3.87	2.51	3.87	2.51	3.87	2.51	3.87	2.51	3.87	2.51	3.87	2.51
From Current Site to Storage	-	-	23.25	11.28	-	-	-	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>23.25</b>	<b>11.28</b>	<b>39.88</b>	<b>22.49</b>	<b>40.26</b>	<b>22.34</b>	<b>49.86</b>	<b>31.36</b>	<b>49.59</b>	<b>31.67</b>	<b>46.41</b>	<b>29.80</b>	<b>46.74</b>	<b>29.95</b>



To LES-C

DOE-UDS AUGUST 29, 2002, CONTRACT QUANTITIES & COSTS		
UDS Conversion & Disposal Quantities:	Target Million kgU	
	Depleted UF <sub>6</sub> (a)	U X 0.676 = (b)
FY 2005 (Aug. - Sept.)	1,050	0,710
FY 2006	27,825	18.8
FY 2007	31,500	21,294
FY 2008	31,500	21,294
FY 2009	31,500	21,294
FY 2010 (Oct.-July)	26,250	17,745
Total:	149,625	101,147
Nominal Conversion Capacity (c) and Target Conversion Rate (Million kgU/yr) $[18.0 + 13.5] \times 0.676$		21.3
UDS Contract Workscope Costs (d): Million \$		
Design, Permitting, Project Management, etc. p. B-2(a)		27.99
Construct Paducah Conversion Facility p. B-3(b)		93.96
Construct Portsmouth Conversion Facility p. B-3(c)		90.40
Operations for First 5 Years Depleted UF <sub>6</sub> & Depleted U <sub>3</sub> O <sub>8</sub> (e) p. B-3(d)		283.23
Contract Estimated Total Cost w/o Fee		495.58
Contract Estimated Value per DOE PR, August 29, 2003 From LES-D		558.00
Difference Between Cost & Value is the Estimated Fee of 12.6% $[558.0 - 495.58]$		62.42
Capital Cost without Fee $[27.99 + 93.96 + 90.40]$		212.35
Capital Cost with Fee $[212.35 \times 1.126]$		239.10
First 5 Years Operating Cost with Fee $[283.23 \times 1.126]$		318.92
Estimated Unit Conversion & Disposal Costs:		
Unit Capital Cost (f)		\$0.77/kgU
2005-2010 Unit Operating Costs in 2002\$ $[318.92 / 101.147]$		\$3.15/kgU
Total Estimated Unit Cost		\$3.92/kgU
(a) As on page B-10 of the UDS contract p. B-10, first column (b) Depleted UF <sub>6</sub> weight multiplied by the uranium atomic mass fraction, 0.676. (c) Based on page H-34 of the UDS contract p. H-34, Item 3 X 0.676 (d) Workscope costs on an UDS contract pages B-2 and B-3. (e) Does not include any potential off-set credit for HF sales. (f) Assumed operation over 25 years, 6% government cost of money, and no taxes.		

From DOE-UDS  
p. H-34, Item 3



From LES-E

To ER Table 4.13 - b

DE-AC05-02OR22717

(i)



Table 4. Number of Kilograms Processed - Incentive Table						
Evaluation Period	Target No. Kg	Target Fee	Minimum No. of Kg	Minimum No. of Kg Fee	No. Kg for Maximum Fee	Maximum Fee
FY2005 (Aug->Sep)	1,050,000	\$ 551,748	525,000	\$ 220,699	1,837,000	\$ 662,098
FY2006 (Oct->Sep)	27,825,000	\$1,407,534	19,500,000	\$ 563,013	31,237,000	\$1,689,040
FY2007 (Oct->Sep)	31,500,000	\$1,415,124	22,000,000	\$ 566,049	35,300,000	\$1,698,148
FY2008 (Oct->Sep)	31,500,000	\$1,330,139	22,000,000	\$ 532,055	35,300,000	\$1,596,166
FY2009 (Oct->Sep)	31,500,000	\$1,295,696	22,000,000	\$ 518,278	35,300,000	\$1,554,835
FY2010 (Oct->Jul)	26,250,000	\$1,080,494	18,375,000	\$ 432,198	29,416,667	\$1,296,593

Notes to Table 4:

1) FY2005 and FY2010 represent 2 months and 10 months of operations, respectively.

- (ii) The fee payable under this Incentive, (f)(2), shall be the target fee for each evaluation period listed in the Number of Kilograms Processed - Incentive Table in paragraph (f) (2) (i) above (1) increased by (see Table 5) cents(s) for every kilogram actually processed in an evaluation period that exceeds the target kilograms for each evaluation period listed in the table described in (f)(2)(i) above or (2) decreased by (see Table 6) cent(s) for every kilogram actually processed that is less than the target number of kilograms for each evaluation period listed in the table described in (f)(2)(i) above. In no event shall the fee earned in an evaluation period for the number of kilogram's processed be greater than the maximum fee. No fee shall be earned under this incentive for each evaluation period if the minimum number of kilograms listed for each evaluation period in the table in (f)(2)(i) above is not processed and accepted by the disposition site during the evaluation period.

49%	70%
48.0 to 49.9% HF	70.0% HF minimum
U <= 1 ppm	U <= 1 ppm
Color - Clear	Color - Clear

(3) Plant Nominal Conversion Capacity

Paducah -18,000 MT DUF<sub>6</sub> per year  
 Portsmouth -13,500 MT DUF<sub>6</sub> per year

} To ER Table 4.13-6.

(4) Plant Waste Streams are as follows:

- (i) Stack emissions: Emission streams consisting of process off-gas and containing trace uranium and fluorine
- (ii) Contaminated Liquid waste streams: None
- (iii) Low Level Radioactive Wastes:
  - DUF<sub>6</sub> cylinders
  - PPE and consumables
  - HEPA filters
- (iv) Hazardous Wastes:
  - Fluids from maintenance activities ( oils, hydraulic fluids )
  - Laboratory acids and residues
- (v) Mixed Wastes : none
- (vi) Transuranic Wastes: none
- (vii) Toxic Wastes: none
- (viii) Other Wastes
  - Sanitary waste water
  - Cylinder yard waste ( concrete and wooden chocks )
  - CaF<sub>2</sub> ( if declared a waste )
  - Miscellaneous garbage

(b) In the event this clause is inconsistent with the Statement of Work contained in Section C, this clause will have precedence.

[End of Clause]

**SECTION B  
SUPPLIES OR SERVICES AND PRICES/COSTS**

**B.1 ITEMS BEING ACQUIRED**

- (a) The Contractor shall furnish all personnel, facilities, equipment, material, supplies, and services (except as may be expressly set forth in this contract as furnished by the Government) and otherwise do all things necessary for, or incident to, the performance of the Statement of Work in Section C.
- (b) Reports shall be prepared and submitted in accordance with Section J, Attachment M, Reporting Requirements Checklist, other clauses in the contract which specify reporting requirements, and other directions from the Contracting Officer or designee. The content of the specified plans and reports shall be in accordance with DOE Order 1332.1A, "Uniform Reporting System". The Contractor shall employ a project management reporting system which utilizes an integrated, resource-loaded, earned value planning and reporting system to produce formats consistent with the above content. The level of detail the Contractor provides in the plans and reports shall be commensurate with the scope and complexity of the task and the reporting categories delineated in Block 4, Planning and Reporting Requirements, and Block 6, Special Instructions, on the Reporting Requirements Checklist, or in a particular clause. The Contractor shall be responsible for levying appropriate reporting requirements on any subcontractors in such a manner as to ensure an integrated, bottom-to-top planning and reporting system which will meet the Contractor's reporting requirements to DOE.

[End of Clause]

**B.2 ESTIMATED COST**

All costs presented in this section exclude fee and exclude proceeds from the sale of recycled products.

The total estimated cost for the performance of the work under the contract is \$495,575,799\*. This total amount consists of the following components:

- (a) The total estimated cost for design of two conversion facilities, including system requirements, permitting, project management, conceptual, preliminary, and final design, is \$27,988,709.

L → To ER Table 4.13-6

\* does not include any off-set credit for HF sales

→ To ER Table 4.13-6

- (b) The total estimated cost for construction of the facility at Paducah, KY including site preparation, structures, equipment, pre-operational testing, operational readiness reviews, and project management is \$93,955,874.
- (c) The total estimated cost for construction of the facility at Portsmouth, OH including site preparation, structures, equipment, pre-operational testing, operational readiness reviews, and project management is \$90,401,868.
- (d) The total estimated cost for operations including cylinder management, waste/end product preparation/packaging, transportation, disposition, and project management is \$283,229,348\*.

[End of Clause]

### B.3 FIXED FEE - DESIGN

A fixed fee of \$2,379,040 shall be paid to the Contractor for performance of the design work under B.2 (a) above. There shall be no adjustment in the amount of the fee by reason of differences between any estimate of cost for performance of the work under this contract and the actual costs for performance of that work. Fee is subject to adjustment only under the provisions of the clause in Section I entitled, "Changes." The fixed fee payable under this contract shall become due and payable in monthly installments as approved by the Contracting Officer and in accordance with the clause in Section I entitled "Fixed Fee." The fixed fee shall be applicable to the prime contractor and its members in a joint venture or limited liability company, teaming partner, and subcontractors identified and considered a part of the selection and award of this contract, if any.

[End of Clause]

### B.4 INCENTIVE FEE - CONSTRUCTION

- (a) An incentive fee shall be paid to the Contractor for performance of construction work under B.2 (b) and (c) above in accordance with this clause and the clause entitled "Incentive Fee" in Section I. The target cost, target fee, minimum fee, maximum fee, and cost share ratio are shown below:

(1) Paducah, KY Facility

Target Cost	\$93,955,874
-------------	--------------

\* does not include any off-set credit for HF sales



# DOE NEWS

U.S. DEPARTMENT OF ENERGY • OFFICE OF PUBLIC AFFAIRS • WASHINGTON, DC 20585

**NEWS MEDIA CONTACTS:**

Joseph Davis, 202/586-4940  
Dolline Hatchett, 202/586-5806

FOR IMMEDIATE RELEASE

Thursday, August 29, 2002

## Department of Energy Selects Uranium Disposition Services for Uranium Hexafluoride Conversion Plants in Ohio and Kentucky

WASHINGTON, DC - The Department of Energy (DOE) announced today the competitive selection of Uranium Disposition Services, LLC to design, build, and operate facilities in Paducah, Kentucky and Portsmouth, Ohio to convert the government's inventory of depleted uranium hexafluoride (DUF<sub>6</sub>) for disposal and/or reuse. The contractor will also be responsible for maintaining the depleted uranium and product inventories and transporting depleted uranium from Oak Ridge, Tennessee, to the Portsmouth, Ohio, plant for conversion.

Uranium Disposition Services, which was formed specifically to bid on this new contract, was formed by Framatome ANP Inc., Duratek Federal Services Inc., and Burns and Roe Enterprises Inc. The estimated value of the contract is \$558 million. The contract is being awarded today after a full and open competition and is consistent with Public Law 107-206 recently enacted by Congress mandating the construction of the two facilities. Design, construction and operation of the facilities will be subject to appropriations of funds from Congress. Five companies submitted proposals.

The Department of Energy has a large inventory of DUF<sub>6</sub> material with 56,000, 198,000 and 450,000 metric tons currently stored at its facilities in Tennessee, Ohio, and Kentucky respectively. DUF<sub>6</sub> is a material byproduct of weapons production activities that occurred over the years at the three facilities.

This contract runs from August 29, 2002 to August 3, 2010. The conversion plants will convert the DUF<sub>6</sub> material to triuranium octoxide (U<sub>3</sub>O<sub>8</sub>) which will be suitable for use or disposal. Uranium Disposition Services will operate these facilities for five years after construction has been completed.

- DOE -

R-02-179

LES-D

→ To ER Table 4.13-6

Capacity MM kgU 21.3 = Target Conv. Rate Good Solution - CTRL-SHIFT A to Solve  
 Capital Cost MMS 239.1 11.23 \$/kgU  
 Debt Ratio 0% 0 (0=straight line, 1=SYD)  
 Debt Rate 0.0% 4.0% pmt factor  
 Recovery Period 25 Years 0.0% Income tax rate 25 Years Actual Lifetime  
 Inflation 2.0% 3.0% Interest on cash  
 Rate of Return, ROR 6.00%

Unit Cost of Capital, \$/kgU \$0.77 ← Result of Solver Calculation  
 Unit Op. Costs, \$/kgU \$0.00  
 Total Unit Cost, \$/kgU \$0.77

→ To ER Table 4.13-6

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<u>Income Statement (\$/kgU)</u>																	
Revenue	0.77	0.79	0.80	0.82	0.83	0.85	0.87	0.89	0.90	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.06
Depreciation	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Debt Interest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<u>CashFlow (\$/kgU)</u>																	
Revenue	0.77	0.79	0.80	0.82	0.83	0.85	0.87	0.89	0.90	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.06
Debt Principle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Debt Interest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Cash	-3.74	-3.74	-3.74	0.77	0.79	0.80	0.82	0.83	0.85	0.87	0.89	0.90	0.92	0.94	0.96	0.98	1.00
ROR check	6.00%																
<u>Following is applicable only if Debt Rate is &gt; zero</u>																	
Debt Balance	11.23	10.78	10.33	9.88	9.43	8.98	8.53	8.08	7.63	7.18	6.74	6.29	5.84	5.39	4.94	4.49	4.04
Debt Principle	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Debt Interest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

LES-E

Table 4.13-7 Summary of Depleted UF<sub>6</sub> Disposal Costs From Four Sources  
Page 1 of 1

SUMMARY OF Depleted UF <sub>6</sub> DISPOSAL COSTS FROM FOUR SOURCES				
Source	Costs in 2002 Dollars per kgU			
	Conversion	Disposal	Transportation	Total
LLNL (UCRL-AR-127650 (a))	2.64	2.17	0.25	5.06
UDS Contract (b)	(d)	(d)	(d)	3.92
URENCO (e)	(d)	(d)	(d)	(d)
CEC Cost Estimate (c)	4.93	1.47	0.34	6.74

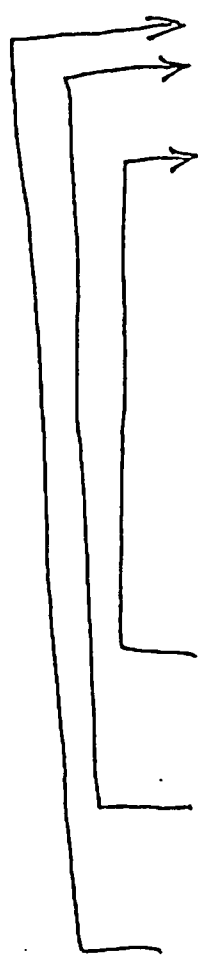
(a) 1997 Lawrence Livermore National Laboratory cost estimate study for DOE; discounted costs in 1996 dollars were undiscounted and escalated to 2002 by ERI.

(b) Uranium Disposition Services (UDS) contract with DOE for capital and operating costs for first five years of Depleted UF<sub>6</sub> conversion and Depleted U<sub>3</sub>O<sub>8</sub> conversion product disposition.

(c) Based upon depleted UF<sub>6</sub> and depleted U<sub>3</sub>O<sub>8</sub> disposition costs provided to the NRC during Claiborne Energy Center license application in 1993.

(d) Cost component proprietary or not made available.

(e) The average of the three costs is \$5.24/kg U. LES has selected \$5.50/kgU as the disposal cost for the National Enrichment Facility. Urenco has reviewed this cost estimate, and based on its current experience with UF<sub>6</sub> disposal, finds this figure to be prudent.



From LES - F

From ER Table 4.13-6, Bottom Line

From ER Table 4.13-5, Column labeled "AHF Alternative, Concrete Vault"

## CEC Cost Estimate Based on Information Provided to NRC in 1993

### Conversion

\$4.00/kgU (1993\$) [Ref. 1, page 1, Item 1]

Escalated at 3.5%/year to 1996:  $\$4.00/\text{kgU} \times 1.035^3 = \$4.44/\text{kgU}$  (1996\$)

Escalated at 11% from 1996 to 2002:  $\$4.44/\text{kgU} \times 1.11 = \$4.93/\text{kgU}$  (2002\$)

### Disposal

\$1.00/kg U<sub>3</sub>O<sub>8</sub> (1993\$) [Ref. 2, page 2, line 2]

Convert from \$/kg U<sub>3</sub>O<sub>8</sub> to \$/kgU:  $\$1.00/\text{kg U}_3\text{O}_8 \times 1.179 \text{ kgU}_3\text{O}_8/\text{kgU} = \$1.18/\text{kgU}$

Escalate at 4.0% /year to 1996 [Ref. 1, Table 2, Item A]:  $\$1.18/\text{kgU} \times 1.04^3 = \$1.327/\text{kgU}$  (1996\$)

Escalated at 11% from 1996 to 2002:  $\$1.327/\text{kgU} \times 1.11 = \$1.47/\text{kgU}$  (2002\$)

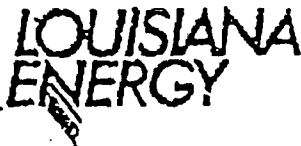
### Transportation

$\$800,000/\text{year}$  (1996\$) [Ref. 1, Table 1, Item B]  $\times 1.179 \text{ kgU}_3\text{O}_8/\text{kgU} = 0.31/\text{kgU}$  (1996\$)  
3.0 Million kg U<sub>3</sub>O<sub>8</sub>/year

Escalated at 11% from 1996 to 2002:  $\$0.31/\text{kgU} \times 1.11 = \$0.34/\text{kgU}$  (2002\$)

### References

1. June 30, 1993 letter to J.W.N. Hickey, NRC, from P.G. LeRoy, LES.
2. June 18, 1993 letter to W.H. Arnold, LES, from J.W.N. Hickey, NRC.



Post Office Box 1004  
Charlotte, NC 28201-1004

June 30, 1993

Mr. John W. N. Hickey, Chief  
Fuel Cycle Safety Branch  
Division of Industrial and  
Medical Nuclear Safety  
Office of Nuclear Material Safety  
and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Subject: Docket No.: 70-3070  
Louisiana Energy Services  
Claihome Enrichment Center  
Disposition of Depleted  
Uranium Hexafluoride  
File: 6046-00-2001.01

Dear Mr. Hickey:

This letter is in response to your letter to Louisiana Energy Services (LES) dated June 18, 1993 regarding the disposition of depleted uranium hexafluoride ( $DUF_6$ ) produced at the Claihome Enrichment Center (CEC). In response to your recommendations, LES has made certain changes for the estimate for disposition of  $DUF_6$ . However, as noted in our license application, we reiterate that the disposition of  $DUF_6$ , including disposition at the end of facility operation, is an element of authorized operation. It involves neither decommissioning waste nor is it a part of decommissioning activities. In that context, LES has revised its estimate as follows:

- 1) The cost of conversion of  $DUF_6$  to depleted uranium oxide ( $DU_3O_8$ ) is based upon an estimate of \$4.00 per kilogram uranium. This estimate was provided to LES by COGEMA.

↳ To LES-F

REFERENCE 1

9307080234 930630  
PDR ADOCK 07003070  
C PDR

NFOH 11

June 30, 1993  
Mr. John W.N. Hickey, Chief  
Page 2

- 2) The cost estimate for disposition of  $DU_3O_8$  has been revised from \$5.50 per ton to \$1.00 per kilogram of  $DU_3O_8$ . This value is based upon your letter and on the value provided in Martin Marietta's report "The Ultimate Disposition of Depleted Uranium", December 1990, p. 17.
- 3) The estimated cost of disposition of the  $DUF_6$  will be included as part of the Decommissioning Funding Plan detailed in Exhibit I of the LES License Application. The funding will be maintained in the external trust to cover the amount of  $DUF_6$  stored at the CEC. Therefore, the funding will increase as more  $DUF_6$  is produced at the beginning of enrichment operations and then level off or decrease as tails are removed from the CEC.
- 4) No credit is taken for salvage and resale of aluminum nor any other material associated with CEC decommissioning. LES acknowledges that Regulatory Guide 3.66 "Standard Format and Content for Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70 and 72", June 1990, section 1.2.2, recommends that "For those who do account for salvage value, a significant gap in coverage could occur if the expected credits are not fully realized. Therefore, in order to ensure the adequacy of funds for decommissioning, cost estimates should not incorporate any salvage value that may be realized with the sale of potential assets." To ensure timely authorization to build and operate the CEC, LES has deleted salvage and resale of aluminum from its cost estimate.

It should be noted that Urenco experience at the Almelo facility justifies the inclusion of aluminum salvage value for the CEC. Aluminum has been reclaimed from the decommissioning of two pilot plants. Centrifuges and other equipment containing aluminum were dismantled, further cut up into small pieces, decontaminated, and sent off-site to a smelter. Of 798 tons of aluminum delivered to the smelter, 710 tons were suitable for resale. (The remaining slag was disposed of as non-radioactive waste.) The aluminum for resale contained between 2 and 4 ppm uranium. The sale price of the aluminum has generally been between 75% and 85% of the European spot market price. In 1990, in The Netherlands, the price was approximately 2.5 guilders (\$1.39) per kilogram of aluminum.

June 30, 1993  
Mr. John W.N. Hickey, Chief  
Page 3

It is intended that recovered aluminum from the CEC will be decontaminated, processed through a smelter, and sold as secondary aluminum ingots on the market. Decontamination and smelting is a simple and relatively inexpensive process, the cost of which is not significantly affected by normally changing economic conditions. Hence, the cost of processing the aluminum for sale should not result in a situation in which expected salvage credits are not fully realized.

Additionally, secondary aluminum is consistently sellable in U.S. and worldwide markets. U.S. Department of Interior data shows a steady trend of secondary aluminum taking a larger and larger share of aluminum production, from 4 - 5% in the 1960s to over 15% in the latter 1980s. Additionally, in 1988, U.S. aluminum supply/consumption data shows over two million metric tons of secondary aluminum consumed in the U.S., with over a million tons of this from "old scrap" aluminum. This data, as well as other information in the reference, also demonstrates that allowing for the salvage value of aluminum should not result in a situation in which expected salvage credits are not fully realized. Nevertheless, as noted, LES has decided not to credit salvage value in our decommissioning cost estimate.

Table I (attached) compares LES' current estimate with the estimate contained in my letter to you dated December 14, 1992.

It should also be noted that LES has recently sent a letter to the U.S. Department of Energy (DOE) indicating that LES would be interested in cooperating with the DOE and the United States Enrichment Corporation (USEC) in coordinating disposition of  $DUF_6$ . This would be in the interest of all parties since we understand the NRC will be regulating the  $DUF_6$  generated by the USEC in a manner similar to the regulation of  $DUF_6$  generated by LES. Since LES must compete with the USEC in the SWU market, it is important that LES not be at a competitive disadvantage in the cost of  $DUF_6$  disposition. This applies not just to actual dispositioning, but to the costs associated with the external trust as well.

The decommissioning funding plan as well as the cost estimate for  $DUF_6$  disposition are detailed in the LES License Application, Exhibit I, the LES Safety Analysis Report (SAR), section 11.8, and the LES Environmental Report (ER) section 4.4. The cost estimates in the License Application, Safety Analysis Report and Environmental Report will be updated in the near future to reflect the information contained in this letter.

June 30, 1993  
Mr. John W.N. Hickey, Chief  
Page 4

As stated currently in the License Application, Exhibit I, LES will review and adjust as necessary the decommissioning cost estimate and decommissioning funding at least once every five years. At such times, or more often if appropriate, LES will also review the cost basis of depleted uranium hexafluoride disposition.

Please call me at (704) 382-2834 if there are any questions concerning this.

Sincerely,

*Peter G. LeRoy*

Peter G. LeRoy  
Licensing Manager

PGL/N91.693

Enclosures

xc: (w/ enclosures)

Mr. Morton B. Margulies, Esq., Chairman  
Administrative Judge  
Atomic Safety and Licensing Board  
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Louisiana Department of Environmental Quality  
PO Box 82135  
Baton Rouge, Louisiana 70884-2135



**Table 1**  
**Comparison of Decommissioning and DUF<sub>6</sub> Disposition Costs**

<u>Cost Category</u>	<u>(Dec 14, 1992) Estimate*</u> <u>(\$1996)</u>	<u>Revised (June __, 1993) Estimate*</u> <u>(\$1996)</u>
<b>DECONTAMINATION AND DECOMMISSIONING (D&amp;D) (ONE TIME COSTS)</b>		
D&D Facility Capital	\$ 6.8	\$ 6.8
D&D Facility Labor	1.4	1.4
UF <sub>6</sub> System Cleaning	1.1	1.1
Plant/System Dismantling	0.0	6.8
Decontamination	13.7	13.7
Aluminum Salvage Value	(7.9)	--
Waste Disposal	1.4	1.4
Hazardous & Mixed Waste Disposal	0.1	0.1
D&D Facility Decontamination	0.5	0.5
Final Radiation Survey	<u>1.0</u>	<u>1.0</u>
<b>D&amp;D Subtotal</b>	<b>\$ 24.0</b>	<b>\$ 32.8</b>
<b>DUF<sub>6</sub> DISPOSITION COSTS (PER YEAR)</b>		
DUF <sub>6</sub> Transportation	\$ 0.0/yr — B	\$ 0.0/yr
DUF <sub>6</sub> Conversion	12.0/yr	12.0/yr
Depleted Uranium Disposal (as DU <sub>3</sub> O <sub>7</sub> ) <sup>2</sup>	<u>0.021/yr</u>	<u>3.375/yr</u>
DUF <sub>6</sub> Disposition Subtotal (1 yr)	\$ 12.021/yr	\$ 16.175/yr
DUF <sub>6</sub> Disposition Subtotal (30 yrs)	\$ 384.6	\$ 485.25
<b><u>TOTAL DECOMMISSIONING AND DUF<sub>6</sub> DISPOSITION COST</u></b>	<b>\$ <u>409.5</u></b>	<b>\$ <u>510.05</u></b>

Notes: 1) All figures shown are millions of dollars.  
 2) See Table 2 for DU<sub>3</sub>O<sub>7</sub> disposition cost estimate basis.

## Table 2 DU<sub>3</sub>O<sub>8</sub> Disposition Estimated Costs

The CEC when operating at nominal capacity of 1.5 million SWU per year will produce approximately 300 48G cylinders of depleted UF<sub>6</sub> per year. Each cylinder of depleted UF<sub>6</sub> will result in approximately 11 tons (22,000 pounds) of depleted U<sub>3</sub>O<sub>8</sub> when converted. Therefore, the CEC will produce approximately:

$$300 \text{ cylinders/year} \times 11 \text{ tons DU}_3\text{O}_8/\text{cylinder} = 3300 \text{ tons DU}_3\text{O}_8/\text{year}$$

The NRC has indicated a reasonable estimate of disposition of DU<sub>3</sub>O<sub>8</sub> is approximately \$1.00 per kilogram of U<sub>3</sub>O<sub>8</sub> (reference NRC letter to LES dated June 18, 1993). Therefore, the cost (\$1993) of dispositioning 3300 tons of DU<sub>3</sub>O<sub>8</sub> per year will be:

$$3300 \text{ tons DU}_3\text{O}_8 \times 909 \text{ kg/ton} \times \$1.00 \text{ per kg} = \$3,000,000 \text{ ($1993)} \quad \boxed{3,000,000}$$

escalating this a <sup>A</sup> (4%) per year to \$1996:

$$\$3,000,000 \text{ ($1993)} \times (1.04)^2 = \$3,374,592 \text{ ($1996)}$$

Therefore, \$3,375,000 per year will be used for the purpose of estimating the dispositioning costs for DU<sub>3</sub>O<sub>8</sub>.



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

JUN 13 1993

Docket No. 70-3070

Louisiana Energy Services, L.P.  
ATTN: Dr. W. Howard Arnold  
President  
2600 Virginia Avenue, N.W.  
Suite 608  
Washington, DC 20037

Dear Dr. Arnold:

I am responding to your letter dated December 14, 1992, regarding the Nuclear Regulatory Commission (NRC) staff's position on the disposition of depleted uranium tails, which would be generated during enrichment operations by Louisiana Energy Services (LES).

Our position is summarized as follows:

1. We agree that it is premature for LES to commit at this time to a prescriptive resolution of the disposition of tails. The Energy Policy Act of 1992 requires the U.S. Department of Energy (DOE) to address the issue of disposition of tails generated at federal gaseous diffusion plants. The inventory of tails stored at DOE enrichment facilities is much larger than the total volume of tails projected to be produced by LES. Therefore, it is reasonable to expect that DOE's determination on disposition will, to a large extent, determine the disposition options for LES tails. What is required at this time is for LES to provide for financial assurance for the Claiborne Enrichment Center's tails disposition.
2. Because some or all of the tails could be at the site at the time of decommissioning, the cost of tails disposition should be included as part of the decommissioning financial assurance. However, the amount of financial assurance could be periodically reduced for any tails removed from the site prior to the end of plant life.
3. The financial assurance should include transportation costs and costs of conversion of the tails to oxide form, with no allowance for the value of conversion products or salvage. It is our understanding that current estimates of the cost of conversion of uranium hexafluoride to oxide are about \$4 per kilogram.
4. You will need to provide a revised estimate of tails disposition costs. Your cost comparison to remedial actions at uranium mills is not appropriate. Mill tailings disposal sites are a specific type of near-surface facility for materials with much lower uranium concentrations than enrichment tails, and normally higher volumes. We had previously indicated that deep mine disposal or a similar alternative is more appropriate for LES tails. Until the specific disposal site and method are identified, the estimated cost is

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Dr. W. Howard Arnold

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To LES-F

uncertain. However, for financial assurance planning purposes, we believe that it is reasonable to assume a disposal cost of approximately \$1.00 per kilogram of U<sub>3</sub>O<sub>8</sub>.

You should submit appropriate revisions to your application to address the above points. The information is needed to complete our safety and environmental reviews. If you have any questions, please contact Dr. Lidia A. Roche' at (301) 504-2695.

Sincerely,

Original Signed By

John W. Hickey, Chief  
Enrichment Branch  
Division of Fuel Cycle Safety  
and Safeguards, NMSS

cc: Attached list

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